Abstract of the Disclosure

The maximum luminous efficiency of organic light-emitting materials is increased through spin-dependent processing. The technique is applicable to all electro-luminescent processes in which light is produced by singlet exciton decay, and all devices which use such effects, including LEDs, super-radiant devices, amplified stimulated emission devices, lasers, other optical microcavity devices, electrically pumped optical amplifiers, and phosphorescence (Ph) based light emitting devices. In preferred embodiments, the emissive material is doped with an impurity, or otherwise modified, to increase the spin-lattice relaxation rate (i.e., decrease the spin-lattice time), and hence raise the efficiency of the device. The material may be a polymer, oligomer, small molecule, single crystal, molecular crystal, or fullerene. The impurity is preferably a magnetic or paramagnetic substance. The invention is applicable to IR, UV, and other electromagnetic radiation generation and is thus not limited to the visible region of the spectrum. The methods of the invention may also be combined with other techniques used to improve device performance.